

AMENDMENT IN RESPONSE TO EX PARTE QUAYLE OFFICE ACTION
Attorney Docket No.: Q92462
U.S. Appln. No.: 10/563,317

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. - 9. (cancelled).

10. (previously presented): An automatic programming method of dividing a whole machining area into a first process region in which one end of a work model is held for a machining and a second process region in which other end of the work model is held for the machining after the machining in the first process region, and creating a program for controlling a numerical control unit based on the division of the machining area, the automatic programming method comprising:
a first process including:
extracting a turning area from the whole machining area that includes the turning area in which a turning is performed and a non-turning area in which machining other than the turning is performed after the turning;
dividing the extracted turning area into an inner diameter machining side and an outer diameter machining side;
obtaining a process-dividing position on the inner diameter machining side that indicates a boundary between the first process region and the second process region on

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the inner diameter machining side, and a process-dividing position on the outer diameter machining side that indicates a boundary between the first process region and the second process region on the outer diameter machining side;

 determining a region from the obtained process-dividing positions on the inner diameter machining side and the outer diameter machining side to the one end of the work model as the first process region; and

 determining a region from the obtained process-dividing positions on the inner diameter machining side and the outer diameter machining side to the other end of the work model as the second process region; and

 a second process including:

 determining the non-turning area as the second process region in such a manner that the non-turning machining area belongs to the second process region, if the determined process-dividing position on the inner diameter machining side or the process-dividing position on the outer diameter machining side is within the non-turning area; and

 creating and outputting the program for controlling the numerical control unit based on the determining in the first process and when available, based on the determining in the second process.

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11. (previously presented): The automatic programming method according to claim 10, wherein

the first process further comprises:

dividing the volume of the machining area, excluding an end-face machining area where an end-face machining is performed for both end faces in a direction of a turning axis from the whole machining area into an inner-diameter machining side and an outer-diameter machining side; and

calculating volumes of the inner-diameter machining side and the outer-diameter machining side, respectively, and

the second process further comprises:

calculating a position that evenly divides the volume of the inner-diameter machining side as a process-dividing position on the inner-diameter machining side; and

calculating a position that evenly divides the volume of the outer-diameter machining side as a process-dividing position on the outer-diameter machining side.

12. (previously amended): The automatic programming method according to claim 11, wherein

the first process further comprises:

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obtaining the machining area excluding the end-face machining area from the whole machining area;

dividing a turning area where a turning is performed from among the machining area excluding the end-face machining area into the inner-diameter machining side and the outer-diameter machining side; and

calculating volumes of the inner-diameter machining side and the outer-diameter machining side, respectively, and

the second process further comprises:

deriving a position that evenly divides the volume of the turning area on the inner-diameter machining side as the process-dividing position on the inner-diameter machining side; and

deriving a position that evenly divides the volume of the turning area on the outer-diameter machining side as the process-dividing position on the outer-diameter machining side.

Claim 13 (canceled).

14. (previously presented): A computer-readable recording medium that stores a computer program for dividing a machining area into a first process region in which one end of a work model is held for a machining and a second process region in which other end of the work

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model is held for the machining after the machining in the first process region, and creating a program for controlling a numerical control unit based on the division of the machining area, wherein

the computer program causes a computer to execute:

a first process including:

extracting a turning area from the machining area that includes the turning area in which a turning is performed and a non-turning area in which a machining other than the turning is performed after the turning;

dividing the extracted turning area into an inner diameter machining side and an outer diameter machining side;

obtaining a process-dividing position on the inner diameter machining side that indicates a boundary between the first process region and the second process region on the inner diameter machining side, and a process-dividing position on the outer diameter machining side that indicates a boundary between the first process region and the second process region on the outer diameter machining side;

determining a region from the obtained process-dividing positions on the inner diameter machining side and the outer diameter machining side to the one end of the work model as the first process region; and

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determining a region from the obtained process-dividing positions on the inner diameter machining side and the outer diameter machining side to the other end of the work model as the second process region;

a second process including:

determining the non-turning area in such a manner that the non-turning machining area belongs to the second process region, if the determined process-dividing position on the inner diameter machining side or the process-dividing position on the outer diameter machining side is within the non-turning area; and

creating and outputting the program for controlling the numerical control unit based on the determining in the first process and when available, based on the determining in the second process.

Claim 15 (canceled).

16. (previously presented): An automatic programming device that divides a machining area into a first process region in which one end of a work model is held for a machining and a second process region in which other end of the work model is held for the machining after the machining in the first process region, and creates a program for controlling a numerical control unit based on the division of the machining area, the automatic programming device comprising:

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a memory unit storing software instructions; and

a processor executing said software instructions,

wherein the software instructions comprise:

a volume calculating unit that calculates a volume of the machining area;

a process dividing unit that extracts a turning area from the machining area that includes the turning area in which turning is performed and a non-turning area in which machining other than the turning is performed after the turning, divides the extracted turning area into an inner diameter machining side and an outer diameter machining side, obtains a process-dividing position on the inner diameter machining side that indicates a boundary between the first process region and the second process region on the inner diameter machining side, and a process-dividing position on the outer diameter machining side that indicates a boundary between the first process region and the second process region on the outer diameter machining side, determines a region from the obtained process-dividing positions on the inner diameter machining side and the outer diameter machining side to the one end of the work model as the first process region, and determines a region from the obtained process-dividing positions on the inner diameter machining side and the outer diameter machining side to the other end of the work model as the second process region;

a process-division correcting unit that determines the non-turning area as in such a manner that the non-turning machining area belongs to the second process region, if the

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determined process-dividing position on the inner diameter machining side or the process-dividing position on the outer diameter machining side is within the non-turning area, and

a program creating unit that creates and outputs the program for controlling the numerical control unit based on operations of the process dividing unit and when available, based on operation in the process-division correcting unit.

17. (previously presented): The automatic programming device according to claim 16, wherein

the volume calculating unit divides the volume of the machining area, excluding an end-face machining area where an end-face machining is performed for both end faces in a direction of a turning axis from the machining area into an inner-diameter machining side and an outer-diameter machining side, and calculates volumes of the inner-diameter machining side and the outer-diameter machining side, respectively, and

the process dividing unit calculates a position that evenly divides the volume of the inner-diameter machining side as a process-dividing position on the inner-diameter machining side, and calculates a position that evenly divides the volume of the outer-diameter machining side as a process-dividing position on the outer-diameter machining side.

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18. (previously presented): The automatic programming device according to claim 17, wherein

the volume calculating unit obtains the machining area excluding the end-face machining area from the machining area, divides a turning area where a turning is performed from among the machining area excluding the end-face machining area into the inner-diameter machining side and the outer-diameter machining side, and calculates volumes of the inner-diameter machining side and the outer-diameter machining side, respectively, and

the process dividing unit derives a position that evenly divides the volume of the turning area on the inner-diameter machining side as the process-dividing position on the inner-diameter machining side, and derives a position that evenly divides the volume of the turning area on the outer-diameter machining side as the process-dividing position on the outer-diameter machining side.

Claim 19 (canceled).